DRAFT

CONSULTANT SERVICES AGREEMENT BETWEEN THE CITY OF SUNNYVALE AND DKS ASSOCIATES FOR AN ADAPTIVE TRAFFIC SIGNAL STUDY

THIS AGREEMENT, dated _____ is by and between the CITY OF SUNNYVALE, a municipal corporation ("CITY"), and DKS Associates ("CONSULTANT").

WHEREAS, CITY is in need of traffic engineering services to conduct a before and after study which quantifies the impact of an adaptive traffic signal system on Sunnyvale-Saratoga Road project intersections; and

WHEREAS, CONSULTANT possesses the skill and expertise to provide the required services;

NOW, THEREFORE, THE PARTIES ENTER INTO THIS AGREEMENT.

1. Services by CONSULTANT

CONSULTANT shall provide services in accordance with Exhibit "A" attached and incorporated by reference. CONSULTANT shall determine the method, details and means of performing the services.

2. Time for Performance

The term of this Agreement shall be from May 1, 2006 to July 1, 2007, unless otherwise terminated. CONSULTANT shall deliver the agreed upon services to CITY as specified in Exhibit "A". Extensions of time may be granted by the City Manager upon a showing of good cause.

3. Duties of CITY

CITY shall supply any documents or information available to City required by CONSULTANT for performance of its duties. Any materials provided shall be returned to CITY upon completion of the work.

4. Compensation

CITY agrees to pay CONSULTANT on a time and expenses basis rates, based upon the rates set forth in Exhibit "B", attached and incorporated. Total compensation shall not exceed Sixty Four Thousand Nine Hundred Forty Five and no/100 Dollars ($64,945.00). CONSULTANT shall submit invoices to CITY to be paid in accord with the procedures set forth in Exhibit "B" attached and incorporated by reference.

5. Ownership of Documents

CITY shall have full and complete access to CONSULTANT's working papers, drawings and other documents during progress of the work. All documents of any description prepared by CONSULTANT shall become the property of the CITY at the completion of the project and upon payment in full to the CONSULTANT. CONSULTANT may retain a copy of all materials produced pursuant to this Agreement.

6. Conflict of Interest

No officer or employee of CITY shall have any interest, direct or indirect, in this Agreement or in the proceeds thereof. During the term of this Agreement CONSULTANT shall not accept employment or an obligation which is inconsistent or incompatible with CONSULTANT's obligations under this Agreement.

7. Confidential Information

CONSULTANT shall maintain in confidence and at no time use, except to the extent required to perform its obligations hereunder, any and all proprietary or confidential information of CITY of which CONSULTANT may become aware in the performance of its services.

8. Compliance with Laws

(a) CONSULTANT shall not discriminate against any employee or applicant for employment because of race, religion, creed, color, national origin, gender, age (persons 40 years or older), disability, or any other basis to the extent prohibited by federal, state, or local law. All employees of CONSULTANT shall be treated during employment without regard to their race, creed, color or national origin.

(b) CONSULTANT shall comply with all federal, state and city laws, statutes, ordinances, rules and regulations and the orders and decrees of any courts or administrative bodies or tribunals in any manner affecting the performance of the Agreement.

9. Independent Contractor

CONSULTANT is acting as an independent contractor in furnishing the services or materials and performing the work required by this Agreement and is not an agent, servant or employee of CITY. Nothing in this Agreement shall be interpreted or construed as creating or establishing the relationship of employer and employee between CITY and CONSULTANT. CONSULTANT is responsible for paying all required state and federal taxes.

10. Indemnity

CONSULTANT shall indemnify, defend and hold harmless CITY and its officers, officials, employees and volunteers from and against all claims, damages, losses and expenses, including attorney fees, arising out of the performance of the work described herein, caused in whole or in part by any negligent act or omission of CONSULTANT, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except where caused by the active negligence, sole negligence, or willful misconduct of CITY.

11. Insurance

CONSULTANT shall take out and maintain during the life of this Agreement policies of insurance as specified in Exhibit "C" attached and incorporated by reference, and shall provide all certificates or endorsements as specified in Exhibit "C."

12. CITY Representative

Dennis Ng, Senior Engineer, as the City Manager's authorized representative, shall represent CITY in all matters pertaining to the services to be rendered under this Agreement. All requirements of CITY pertaining to the services and materials to be rendered under this Agreement shall be coordinated through the CITY representative.

13. CONSULTANT Representative

Kevin Fehon, P.E. shall represent CONSULTANT in all matters pertaining to the services and materials to be rendered under this Agreement; all requirements of CONSULTANT pertaining to the services or materials to be rendered under this Agreement shall be coordinated through the CONSULTANT representative.

14. Notices

All notices required by this Agreement shall be in writing, and shall be personally delivered, sent by first class with postage prepaid, or by sent by commercial courier, addressed as follows:

To CITY:
Dennis Ng, Senior Traffic Engineer
Public Works/Transportation & Traffic
CITY OF SUNNYVALE
P. O. Box 3707
Sunnyvale, CA 94088-3707

To CONSULTANT:
DKS Associates
Attn: Kevin Fehon
1000 Broadway, Suite 450
Oakland, CA 94607

Nothing in this provision shall be construed to prohibit communication by more expedient means, such as by telephone or facsimile transmission, to accomplish timely communication. However, to constitute effective notice, written confirmation of a telephone conversation or an original of a facsimile transmission must be sent by first class mail or commercial carrier, or hand delivered. Each party may change the address by written notice in accordance with this paragraph. Notices delivered personally shall be deemed communicated as of actual receipt; mailed notices shall be deemed communicated as of two days after mailing, unless such date is a date on which there is no mail service. In that event communication is deemed to occur on the next mail service day.

15. Assignment

Neither party shall assign or sublet any portion of this Agreement without the prior written consent of the other party.

16. Termination

If CONSULTANT defaults in the performance of this Agreement, or materially breaches any of its provisions, CITY at its option may terminate this Agreement by giving written notice to CONSULTANT. If CITY fails to pay CONSULTANT, CONSULTANT at its option may terminate this Agreement if the failure is not remedied by CITY within thirty (30) days from the date payment is due.

Without limitation to such rights or remedies as CITY shall otherwise have by law, CITY also shall have the right to terminate this Agreement for any reason upon ten (10) days' written notice to CONSULTANT. In the event of such termination, CONSULTANT shall be compensated in proportion to the percentage of services performed or materials furnished (in relation to the total which would have been performed or furnished) through the date of receipt of notification from CITY to terminate. CONSULTANT shall present CITY with any work product completed at that point in time.

17. Entire Agreement; Amendment

This writing constitutes the entire agreement between the parties relating to the services to be performed or materials to be furnished hereunder. No modification of this Agreement shall be effective unless and until such modification is evidenced by writing signed by all parties.

18. Miscellaneous

Time shall be of the essence in this Agreement. Failure on the part of either party to enforce any provision of this Agreement shall not be construed as a waiver of the right to compel enforcement of such provision or any other provision. This Agreement shall be governed and construed in accordance with the laws of the State of California.

IN WITNESS WHEREOF, the parties have executed this Agreement.

ATTEST:

_____
City Clerk

APPROVED AS TO FORM:

_____
City Attorney

CITY OF SUNNYVALE ("CITY")

_____
City Manager

_____ ("CONSULTANT")

By _____

_____
Name and Title

By _____

_____
Name and Title

EXHIBIT A

3 SCOPE OF WORK

3.1 Overview

The scope of work described below follows the requirements of the RFP. However, because of the detailed knowledge and familiarity the project team already possess of the signal systems, Sunnyvale's street and traffic patterns, and evaluation survey techniques, significant efficiencies are available to the City of Sunnyvale, and the study team will be able to concentrate on system evaluation.

Our knowledge of, and commitment to, high quality and reliable evaluation has allowed us to recommend a superior survey approach that will provide a better product than traditional "before and after" surveys. This will take advantage of the efficiencies described above, and provide excellent value to the City of Sunnyvale.

3.2 Project Management

Project management activities will continue for the duration of the project. The key activities will include the following items.

- Kick-off meeting, to confirm the work scope and schedule, and identify the information that will be required from the City, to assist with both the survey design and conduct of the surveys.
- Regular project meetings and reports (monthly or as otherwise agreed), to provide the City a forum to review work products and project management issues, and allow multiple City staff to participate in the process. Monthly reports will include a statement of progress, work to be done in following period, adherence to budget and schedule, and advance notice of actions required by the City.
- Weekly email progress reports which will provide a brief summary of work completed, identify issues that have arisen, and provide confirmation of the following week's proposed activities.
- Preparation and submission of invoices.

Products: **Monthly progress reports**
Weekly email progress reports
Monthly invoices

3.3 Field Review

The key study team members are already thoroughly familiar with the SCATS and Naztec systems. We are also familiar with the traffic conditions in the area, as a result of the many signal design and timing projects we have undertaken in recent years. As part of this task, we will familiarize ourselves with the signal timing plans of both systems, as they are implemented in the areas of interest. At this time we will request specific data collection from the SCATS on-line monitor and Cupertino's Naztec system, that will be of assistance in confirming the details of the survey design and methodology. These will include such items as SCATS' "strategic monitors" to document cycle lengths, splits and detector

volumes, any TOD schedules that affect the coordinated operation. Similar information will be available from Cupertino.

As part of the field review, we will visit each intersection of interest to observe driver, pedestrian and cyclist behavior, identify suitable locations for survey staff to make observations, and also identify any issues that would affect the reliability of detector volume data (such as poor lane discipline, slow moving queues and illegal parking). Potential travel time routes will be examined, especially to identify convenient locations at which to start and end the runs and provide safe turn-around and staging locations.

At the same time we will obtain from the City any relevant turning movement and mid-block traffic counts that are available. This will help define suitable locations for new counts and may also help to contain the City's data collection costs.

Product: **Internal field notes**
Data requests

3.4 Study Methodology

This task will refine the proposed study methodology, based on the results of the field review, confirmation of the available budget, confirmation of the City's study objectives and availability of City staff and others to participate in surveys. The process adopted will be to document the survey objectives, select the measures of effectiveness that are appropriate for those objectives, define the data requirements and analysis procedures that match the data, then design the surveys themselves so that the right data is collected and the sample size is adequate.

At this proposal stage, we have defined each of those elements below, and they will be confirmed and refined as part of this task.

3.4.1 Proposed Survey Design

In summary, the proposed survey will have the following components:

- Floating car surveys;
- Intersection turning movement counts;
- Intersection vehicle and pedestrian delay surveys;
- Automatic data collection from SCATS detectors;
- Continuous real-time signal timing data from SCATS; and
- Continuous real-time signal timing data from Cupertino's Naztec StreetWise.

The most significant aspect of our proposed survey design is the use of a structured "Latin Squares" approach to provide a rigorous evaluation environment, rather than the tradition "before" and "after" surveys separated by some period of time. Therefore, rather than conduct some surveys, wait until the SCATS improvements are implemented, then conduct further surveys, we propose to operate the SCATS intersections in two modes on a schedule that ensures an adequate and repeatable sample. This will ensure that drivers do not change their patterns between the two modes.

We propose to conduct the surveys over a two-week period, with the signals operating on the schedule in Table 1. While the signals will operate in this manner for two weeks, the various surveys will conducted on a sample basis during that time, controlling costs while provide adequate data.

Table 1 Proposed signal mode schedule

Day of Week	Week 1	Week 2
Monday	Free	SCATS
Tuesday	SCATS	Free
Wednesday	Free	SCATS
Thursday	SCATS	Free
Friday	Free	SCATS
Saturday	SCATS	Free
Sunday	Free	SCATS

The RFP requests survey data for a minimum of the following periods:

- AM peak
- AM off-peak
- Mid-day peak
- PM off-peak
- PM peak
- One weekend period.

The surveys will be designed to cover these periods, and include the times when the TOD plans transition from one plan to the next. The weekend period will be selected based on a review of the traffic volume profiles and an assessment of the extent to which SCATS operation would be expected to vary from the traditional TOD or free operation. Consideration should also be given to the post-PM evening period. This is one of the periods when SCATS often shows superior performance of TOD and free operation, because (a) its ability to run lower coordinated cycle lengths than many other systems, and (b) because of the significant day-to-day variation in the optimal time to shift between different coordinated cycle lengths and free operation as traffic volumes reduce from the PM peak level.

Floating car surveys will be conducted along Sunnyvale-Saratoga Road to collect travel time, delay and stops information. This will be done using DKS's GPS survey equipment, which will allow direct uploads of computer files and by-pass the labor- intensive manual process of transcribing data from paper records. It also provides better quality data that can be re-analyzed with alternative definitions at a later date. These surveys will include El Camino Real and Homestead Avenue intersections, to be sure that the interaction between the new intersections and the existing SCATS and Streetwise systems are considered.

Side street and turning movement delays will be estimated using a post-processing procedure that uses arrival and volume information collected in the field. This will require surveyors to count the number of vehicles that arrive during the red and green periods, and noting any vehicles not served at the end of the green. This will be done as samples, conducting the surveys at sites selected based on side street and minor movement volumes, and with each movement sampled several times each hour. The traffic volume data will be used to extrapolate those samples to represent the population of road users making those movements. The key parameters sampled and to be used in the evaluation are:

- Number of vehicles queued at the start of green;
- Number of queued vehicles not served by the first green; and
- Number of vehicles passing through the green with no delay.

Pedestrian behavior will be surveyed at each intersection on one day under each operational scenario. The numbers of pedestrians crossing during the walk, flashing don't walk and don't walk periods will be recorded. This data will later be combined with the signal system real-time monitor data to estimate pedestrian delays. This process is further described below.

The side street and pedestrian studies will be conducted as paired observations. Each location will be surveyed twice, once with each signal operation mode. Observations will be conducted at each important movement, to be determined with City staff. Allowance is made for surveys of up to ten movements.

Cycle failure estimates will be derived from two different data sets. The side street and minor movement data described above will be used to identify observed cycle failures. This information will be compared with the SCATS monitor data to relate the cycle failures to the measured levels of occupancy (using the DS parameter). This will allow the team to identify DS levels above which queues would be expected not to clear, and assess the percentage of cycles in which this occurs under each operational scenario.

System interaction will be assessed based on two approaches. The floating car surveys described above will provide sample data on the frequency with which platoons stop at the first intersection when entering and leaving the SCATS-controlled section. This will be supplemented by data collected from the system monitors of the different systems. A continuous time-space diagram will be developed showing the relative state of the signals at adjacent intersections, and providing a means of quantifying the percentage of platoons are fully coordinated, partially coordinated or not coordinated. This will be illustrated graphically for the purposes of educating readers of the report, but will most be calculated using purpose-written software.

The SCATS computer will be used to maintain a full record of the signal system operation and detector data collection throughout the survey period. This will include the cycle length, splits and offsets for each intersection; strategic monitor recording traffic volume estimates and degree of saturation for selected detectors, all time-stamped.

3.4.2 Proposed Analysis Techniques

It is proposed to use a combination of the analysis techniques described earlier, to provide a complete and reliable evaluation of the SCATS implementation, but at the same time maintain good value for money for the City and an acceptable budget.

The overall travel times will be calculated for the sample data and for weighted total travel time. These parameters will be plotted against demand volume, regression lines calculated and the differences of means calculated. A confidence limit will be calculated for each set of data, so that the City will have an assessment of the reliability of the conclusions.

Side street delays will be calculated for the individual samples, and extrapolated to represent the population of users, by weighting the samples by the volume data obtained form the SCATS real-time record and the sample turning movement counts. The comparison of Free and SCATS operation will be made in two ways:

- Comparison of the weighted average delay calculated for each scenario; and
- Comparison of the differences measured by the paired observations. This data will be tested using a non-parametric statistical test, such as Wilcoxon Matched-Pairs Test.

Pedestrian delays and pedestrian observance of the signals will both be analysed using the Wilcoxon Matched-Pairs Test.

The assessment of the level of interaction between the new SCATS signals and the existing coordinated groups at each end of the section will be done in two ways. The travel time surveys will include stops and delays at El Camino Real and at Homestead Road. This willl allow the progression through the transition sections to be directly monitored, and delays and stops calculated. In addition, time-space diagrams will be constructed from the SCATS real-time monitor data, and Cupertino's Streetwise database. By calibrating these data with the time-clock data, a measure of coordination will be calculated based on the percentage of time platoons within the green band receive greens at the transitions.

Product: **Draft Study Methodology and Procedure Report**
Final Study Methodology and Procedure Report

3.5 Field Surveys

In this task the field surveys will be undertaken, following the design described above. One practice day will held a week before the surveys start, to ensure that all surveyors are familiar with their responsibilities and also provide the opportunity to modify the schedule or design to accommodate any difficulties that become apparent.

A surveyor supervisor will be assigned and sufficient reserves in place that there will be no holes in the data sets.

Product: **Survey data**

3.6 Data Evaluation

In this task, the field survey data and signal system data will be stored, manipulated and analyzed in accordance with the design described above. As each section of data is analyzed it will be subjected to quality reviews and made available to the City. By doing this in stages, it will provide the City staff with the opportunity to review the results over a period of time, rather than be expected to review the whole product at once. It will also provide the opportunity for staff to suggest changes and provide input to the process, so that the analysis or style of presentation may be modified and improved during the process without subject the team to large amounts of re-work. Comments received on the progress

results will be incorporated into the draft evaluation report, to be prepared under the next task.

Product: Draft evaluation tables and figures

3.7 Evaluation Report

Once the full data analysis is complete, the results will be compiled into a draft report and submitted for review by the City. In addition to presenting the results and conclusions, the report will fully document the study design and methodology, so that it may be fully repeated or modified for future annual evaluations.

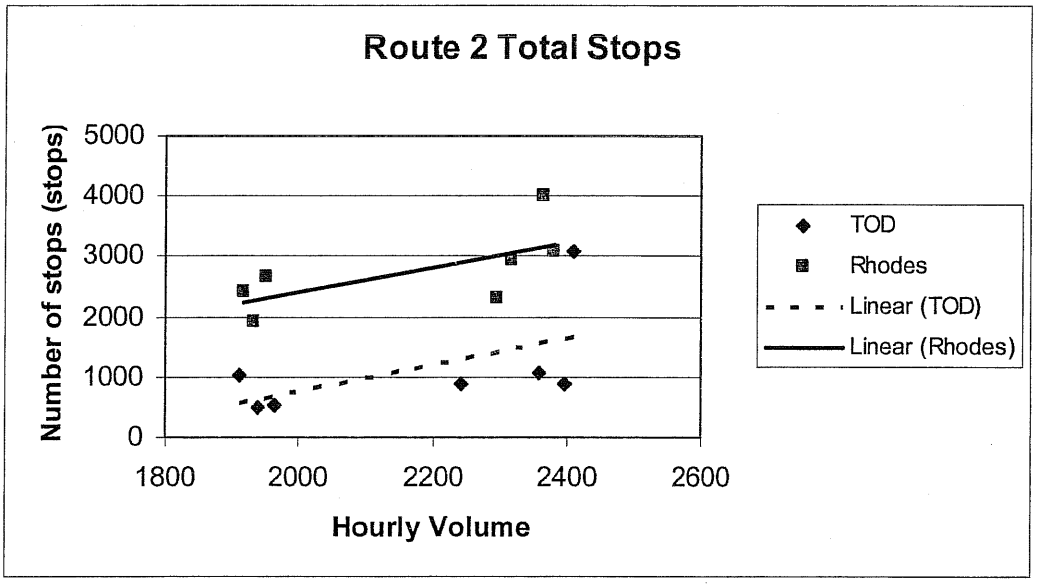

Figure 3 Sample presentation of total stops on a route

Where possible, statistical significance of results will be reported. An example of the manner in which this can be done to support the conclusions is illustrated in Table 2. A method of reporting the side street delay study is illustrated in Figure 4.

Table 2 Statistical analysis of travel time differences

Parameter	Number	Percentage
Number of travel time comparisons	62	
Number with statistically significant differences	35	56%
No. with significantly better under RHODES	15	24%
No. significantly worse under RHODES	20	32%

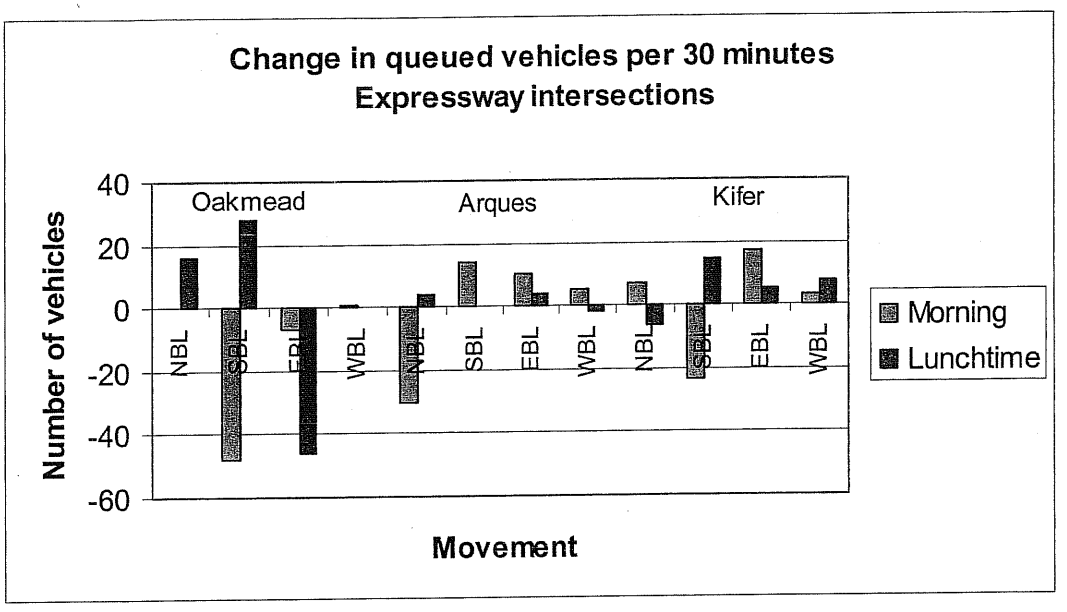

Figure 4 Change in number of side street queued vehicles.

Following receipt of the City's comments, the analysis will be completed, conclusions refined and the Final Evaluation Report prepared.

Product: **Draft Evaluation Report**
FinalEvaluation Report

3.8 Schedule

The final schedule will be dependent on the agreed study methodology and the time at which the SCATS implementation is completed and fine tuned. The DKS Associates team is available to commence the project immediately, and will schedule the surveys to occur shortly after the SCATS implementation is complete. Should this occur during the summer, we are prepared to undertake the surveys after the beginning of the school year, when traffic will be back to its normal levels. We anticipate that the draft evaluation report will be available approximately six weeks after completion of the surveys.

This schedule can be modified to comply with other City requirements.

Exhibit B

Sunnyvale Adaptive Traffic Study
Proposed Budget

Task	Budget	Fehon $205/hr	Peters $125/hr	Espitia $80/hr	Story $165/hr	Leung $85/hr	Admin $65/hr	Sub-consultant	ODC
1 Project Management	$ 6,025	24	4				5		$ 280
2 Field Review	$ 4,780	16				16			$ 140
3 Study Methodology	$ 6,525	24	8	4	0		4		$ 25
4 Field Surveys	$ 18,400					65		$ 11,275	$ 1,600
5 Data Evaluation	$ 20,845	40	12	80	8	40			$ 25
6 Evaluation Report	$ 8,370	20	4	8	0	24	16		$ 50
Totals	**$ 64,945**	**124**	**28**	**92**	**8**	**145**	**25**	**$ 11,275**	**$ 2,120**

EXHIBIT "C"
INSURANCE REQUIREMENTS

CONSULTANT shall procure and maintain for the duration of the Agreement insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the work by CONSULTANT, its agents, representatives, or employees.

Minimum Scope and Limits of Insurance

CONSULTANT shall maintain limits no less than:

1. **Commercial General Liability**: $1,000,000 per occurrence for bodily injury, personal injury and property damage. If Commercial General Liability Insurance or other form with a general aggregate limit is used, either the general aggregate limit shall apply separately to this project/location or the general aggregate limit shall be twice the required occurrence limit. ISO Occurrence Form CG 0001 is required.

2. **Automobile Liability**: $1,000,000 per accident for bodily injury and property damage. ISO Form CA 0001 is required.

3. **Workers' Compensation** and **Employer's Liability**: $1,000,000 per accident for bodily injury or disease.

4. **Errors and Omissions** Liability Insurance appropriate to CONSULTANT's profession: $1,000,000 per occurrence.

Deductibles and Self-Insured Retentions

Any deductibles or self-insured retentions must be declared and approved by CITY. CONSULTANT shall guarantee payment of any losses and related investigations, claim administration and defense expenses within the deductible or self-insured retention.

Other Insurance Provisions

The **general liability** and **automobile liability** policies are to contain, or be endorsed to contain, the following provisions:

1. CITY, its officials, employees, agents and volunteers are to be covered as additional insureds with respect to liability arising out of activities performed by or on behalf of CONSULTANT; products and completed operations of CONSULTANT; premises owned, occupied or used by CONSULTANT; or automobiles owned, leased, hired or borrowed by CONSULTANT. The coverage shall contain no special limitations on the scope of protection afforded to CITY, its officers, employees, agents or volunteers, except as follows: Coverage shall not extend to any indemnity coverage for the active negligence of the additional insured in any case where an agreement to indemnify the additional insured would be invalid under Subdivision (b) of section 2782 of the Civil Code.

2. For any claims related to this project, CONSULTANT's insurance shall be primary. Any insurance or self-insurance maintained by CITY, its officers, officials, employees, agents and volunteers shall be excess of CONSULTANT's insurance and shall not contribute with it.

3. Any failure to comply with reporting or other provisions of the policies including breaches of warranties shall not affect coverage provided to CITY, its officers, officials, employees, agents or volunteers.

4. CONSULTANT's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

5. Each insurance policy required by this clause shall be endorsed to state that coverage shall not be suspended, voided, cancelled by either party, reduced in coverage or in limits except after thirty (30) days' prior written notice by certified mail, return receipt requested, has been given to CITY.

Acceptability of Insurers

Insurance is to be placed with insurers with a current A.M. Best's rating of no less than A:VII, unless otherwise acceptable to CITY.

Verification of Coverage

CONSULTANT shall furnish to CITY original Certificate(s) of Insurance and endorsements effecting the coverage required. The Certificate(s) shall be signed by a person authorized by that insurer to bind coverage on its behalf. All certificates and endorsements are to be received and approved by CITY prior to commencement of work.